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Costs of Marking Black Spruce for Cutting in Northern Minnesota

Forest managers are aware that the cost of marking a stand of timber for cutting has an influence on their net return. But information on the extent of this influence and on how these costs vary with different marking methods generally has not been available. In a recent study it was found that the time required to mark a cord of black spruce was significantly different for various methods and intensities of cutting. In some cases, the marking cost amounted to a sizable proportion of the stumpage value of the timber cut.

During 1948 to 1950, a study to determine the effects of cutting intensities on the growth of black spruce in northern Minnesota was established on the Big Falls Experimental Forest by the Lake States Forest Experiment Station in cooperation with the Minnesota State Division of Forestry. Records were kept of the marking costs on 3 compartments clear cut in patches (14 patches from 0.2 to 0.5 acre in size), on 3 compartments clear cut in strips (5 strips from 0.7 to 1.6 acres in size), and on 10 partial-cut areas from 6.7 to 9.4 acres in size. The estimated volumes marked for cutting on the clear-cut areas varied from 18 to 28 cords per acre, while on the partial-cut areas they varied from 14 to 17 cords per acre under the shelterwood system and from 5 to 9 cords per acre under the light selection cutting systems. Trees to be cut ranged from 4 to 13 inches in diameter, although more than half of them fell within the 4- to 6-inch diameter range.

Marking was done with paint guns. Boundaries of the areas to be clear cut were designated, but individual trees were not marked. On partial-cut areas where less than half of the stand volume was to be cut (light selection cuts), individual trees to be cut were marked. On partial-cut areas where more than half of the stand volume was to be cut (shelterwood cuts), the trees to be left in the residual stand were marked.

An analysis of the costs showed that it took about twice as long to mark a cord of black spruce under the shelterwood system and nearly five times as long under the light selection cut system, where individual trees were marked, as under the clear-cut system where area boundaries were designated (table 1).

Table 1.--Marking time per cord of black spruce, for various cutting methods, Big Falls Compartment Study, 1948-1950

(In man-hours per cord)

Cutting method	Mean marking time	95-percent confidence interval of the mean marking time
Clear cut	0.065	± 0.017
Shelterwood	0.120	± 0.035
Light selection	0.300	± 0.072

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A more detailed examination of marking costs for light selection cuts revealed a highly significant relationship between marking time per cord and the number of trees marked per acre. Marking times ranged from 0.16 man-hours per cord when 320 trees per acre were marked, to 0.39 man-hours per cord when only 200 trees per acre were marked (table 2).

Table 2.--Marking time per cord of black spruce for various intensities of light selection cutting, Big Falls Compartment Study, 1948-1950

(In man-hours per cord)

Number of trees marked for cutting (per acre)	Estimated marking time	95-percent confidence interval of estimated marking time
200	0.39	± 0.05
220	0.35	± 0.04
240	0.31	± 0.03
260	0.27	± 0.03
280	0.24	± 0.04
300	0.20	± 0.05
320	0.16	± 0.07

If an average wage of $2 an hour for timber markers is assumed for purposes of illustration, the labor cost of marking on the areas studied would have averaged $0.13 per cord on clear-cut areas, $0.24 per cord on shelterwood areas, and from $0.32 to $0.78 per cord on light selection cutting areas. With black spruce stumpage selling at from $4 to $6 a cord, the labor cost alone for marking light selection cuts could amount to a substantial part (up to 20 percent) of the gross stumpage receipts. In contrast, the labor cost of marking clear-cut areas would be only 2 or 3 percent of the stumpage return.

Other expenses, such as the cost of paint and travel time to the cutting area, should be included in the total marking cost. Although no record of these costs was kept on this particular study, records from other studies indicate that such expenses may amount to about 10 or 20 percent of the labor cost.

The range of marking costs found in this study illustrates how partial cuttings may increase management costs. In selecting an appropriate cutting system, the forest manager should weigh carefully the expected returns against the costs incurred under each system.